Project Narrative - Cover Page

Project Title: Allegheny County Targeted Air Shed Grant PM2.5-Reducing Transportation Projects

Applicant Information:

Organization: Allegheny County Health Department
ACHD is responsible for the development and implementation of the state implementation plan (SIP) to attain and maintain the national ambient air quality standard for PM2.5 within the Allegheny County PM2.5 (2012 Annual Standard) Non-Attainment Area defined in Section I.A. of the RFA. The ACHD is currently receiving a continuing air program grant under Section 105 of the Clean Air Act to carry out those responsibilities. (Grant#A-003041-20).

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Budget Summary

Project Number	Name	EPA Funding Requested	Voluntary Cost Share, if applicable	Total Project Cost
1	City of Pittsburgh - CNG fueled waste haulers and renewable natural gas fueling station	$6,500,000		$6,500,000
2	Allegheny County - Parks Department propane powered equipment	$869,000		$869,000
3	Allegheny County - Public Works Department clean diesel equipment	$5,777,129		$5,777,129
4	Port Authority Transit - Battery Electric Buses for Pittsburgh Bus Rapid Transit	$5,650,000		$5,650,000
	Personnel	$56,388		$56,388
	TOTAL	**$18,852,517**		**$18,852,517**

Project Period: October 1, 2020 to September 30, 2025.

Brief Project Description:

- Project (1) will replace 10 City of Pittsburgh diesel powered municipal waste haulers with 10 CNG fueled haulers and add a renewable natural gas fueling station.
- Project (2) will replace Allegheny County Parks Department diesel powered equipment including the showmobile trailer truck, two snow groomers, and five trim tractors with propane fueled equipment, and add a propane storage tank.
- Project (3) will replace Allegheny County Public Works Department diesel equipment with the clean diesel equipment.
- Project (4) will assist the Allegheny County Port Authority Transit to move from diesel to electric transit buses by funding the differential in cost between the two types of motive power for seven buses and adding one electric charging station.

Project Location: The projects are in Allegheny County, Pennsylvania. The benefits will be realized throughout Allegheny County.

Narrative Proposal Work-Plan

This narrative proposal addresses the category of "Transportation" found in Section I.B of the RFA.

Section 1. Project Summary/Approach

A. Ongoing, Significant Emissions Reductions & Consideration of Other Activities.

Exposure to PM2.5 is associated with short-term health effects such as eye, nose, throat and lung irritation, coughing, sneezing and runny nose, shortness of breath and asthma attacks. People breathing in PM2.5 are more likely to need to be admitted to hospitals for treatment of respiratory and cardiovascular hospital ailments. Studies also suggest that long term exposure to fine particulate matter may be associated with increased rates of chronic bronchitis, reduced lung function and increased mortality from lung cancer and heart disease. Those with breathing and heart problems, children and the elderly may be particularly sensitive to $PM_{2.5.}$

The PM2.5 concentrations in Allegheny County are among the highest in the nation and compromise the health and well-being of the Allegheny County residents. It is the desire of all that more be done to reduce PM2.5 in Allegheny County, and these projects do that. These replacements will reduce emissions of fine particulate matter (PM2.5) from mobile sources and result in improvement in air quality in Allegheny County, helping Allegheny County to approach attainment of the National Ambient Air Quality Standard for PM2.5.

Project (1) - City of Pittsburgh CNG fueled waste haulers and renewable natural gas fueling station

Project Participant Partner – Government of the City of Pittsburgh

The City of Pittsburgh project will procure 10 CNG powered refuse trucks ($400,000 each) and a renewable natural gas (RNG) fueling station ($2.5million). The total project cost would be $6,500,000.

The City of Pittsburgh's refuse fleet of roughly 75 diesel powered vehicles is the dirtiest of their fleet at a fuel economy of 3 miles per gallon, traveling roughly 10,750 miles annually throughout the City's neighborhoods. Most of the City's refuse fleet vehicles run 5-6 days per week.

Currently the City has 4 CNG trucks with an additional 8 to be ordered over 2020 & 2021 budget years. With the 10 that the project would add, their fleet would be at 22, reducing their NOx output by about 40-45%. The project will greatly enhance the City's conversion efforts.

Specific reductions for this project are: PM2.5 = 0.119 tons/yr. and 0.595 tons lifetime; NOx = 1.327 tpy and 6.636 lifetime (based on five year lifetime of remaining years of replaced diesel waste haulers).

The Refueling Natural Gas (RNG) station will reduce GHG emissions since RNG produces about 48% less GHG emissions than diesel, versus 17% for CNG over diesel. The RNG fueling station is a mobile solution that would source local landfill gas.

Expected Benefits to Public Health and/or Environment and the Community

The health of residents living in all neighborhoods of the City of Pittsburgh will be benefitted by the project. Many of these neighborhoods are Environmental Justice communities as explained below for the Port Authority project.

Project Cost, Leverage, and Schedule

The project is expected to cost $6,500,000. No Leverage. The City can complete the project in approximately 12-16 months from project approval.

Allegheny County Projects – Projects (2) and (3)

Background information:

The county has over 160 diesel fueled on-road vehicles and non-road equipment. Many of these vehicles, specifically the single axle and tandem dump trucks and the county's truck trailer for the Park's Show Mobile, do not meet current emissions standards. Any replacement of these vehicles will provide reduced emissions through the replacement vehicles meeting new and improved emissions standards.

The County's Park Departments has been exploring the use of alternative fuel vehicles, both electric, compressed natural gas (CNG), and propane. Due to unreliable electric grid in the county parks, with constant power outages, and limited larger vehicles available, electric is not a reasonable choice. Although CNG vehicles are available to replace some of the park's more common vehicles, the infrastructure is limited near most of the county parks, and the cost for county owned infrastructure would outweigh the benefits. Propane, with similar emissions reductions to CNG, as well as being a domestic product, offers infrastructure that is more affordable for a decentralized fleet like the county parks. CNG fueling is available near North Park, where the showmobile truck is parked when not in use, allowing convenient refueling. For the trim tractors, propane tanks will be placed in county parks for more convenient refueling as the county transitions available equipment to propane fuel.

Specific Information

Project (2) - Allegheny County Parks Department propane and clean diesel-powered equipment

This project will replace eight pieces of Allegheny County Parks Department dirty diesel-powered equipment with equipment powered by propane, CNG, or clean diesel/hybrid electric.

Equipment to be replaced includes:

1. The diesel-powered heavy-duty truck (MY1990) that pulls the County Parks Showmobile. The new truck will be powered by CNG.
2. Two diesel powered snow groomers (MY2000) used on the County Park ski slopes will be replaced by snow groomers powered by clean diesel or diesel-electric hybrid engines.
3. Five trim tractors (MY2003 and 2005) will be replaced by propane powered trim tractors (grass cutters).

The lower emissions replacement equipment will reduce emissions of fine particulate, PM2.5, at the parks and ski slopes by 0.11 tons per year, and 0.4 lifetime tons. NOx reductions are 0.575 tpy and 1.9 lifetime tons.

Expected Benefits to Public Health and/or Environment and the Community

The County's Parks Department maintains parks throughout the county.

Based on a 2017 survey, annual County Parks visitation numbered over 20 million visits per year (89% adults over 18) (82% Allegheny county residents). The Snow Groomers are used in Boyce Park at the County Ski Lodge to groom the slopes. The park had 1.7 million visits per year, 1.4 million just from Allegheny county at Boyce Park. The snow groomers are used about 400 hours over the ski season.

The County Showmobile Truck transports the county park's showmobile trailer to county parks for events held in county parks including races, concerts, speakers, family reunions, etc. It travels to all 9 county owned parks. Trim Tractors are used to groom county parks

This project will reduce toxic PM2.5 diesel emissions throughout the county parks.

Cost, Leverage and Schedule

The project is expected to cost $933,829. No Leverage. The County can complete the project in approximately 12-16 months from project approval.

Specific Information

Project (3) - Allegheny County Public Works Department clean diesel equipment

This project will replace 31 pieces of Allegheny County Public Works Department dirty diesel-powered equipment with equipment powered by clean diesel engines.

Equipment to be replaced include:

1. Four diesel powered heavy duty tandem axle dump trucks (MY1995, 2003 & 2005). The new trucks will be powered by clean diesel engines from the most recent model year.
2. Nine diesel powered heavy duty single axle dump trucks (MY1998, 2003, 2004 & 2005). The new trucks will be powered by clean diesel engines from the most recent model year.
3. Two diesel powered bucket trucks (MY1999 and 2001). The new trucks will be powered by clean diesel engines from the most recent model year.
4. Eight diesel powered backhoes (MY1997, 2000, 2002, 2007 and 2008). The new backhoes will be powered by clean diesel engines from the most recent model year.
5. Seven diesel powered highlifts/loaders (MY1991, 1993, 1998, 2000, 2002, 2007 and 2008). The new highlifts/loaders will be powered by clean diesel engines from the most recent model year.
6. One diesel powered skidsteer (MY 2008). The new skidsteer will be powered by a clean diesel engine from the most recent model year

The lower emissions replacement equipment will reduce emissions throughout the county by: for PM2.5, 0.08 tons per year, and 0.15 lifetime tons; for NOx, 0.7 tons per year, and 1.34 lifetime tons.

Expected Benefits to Public Health and/or Environment and the Community

County dump trucks deliver materials and bulk material to job sites i.e. – asphalt-aggregate-sand-salt-pipe-geotextile fabric-barricades, pull trailers for grass cutting equipment and other large machinery, haul spoil piles from excavation jobs, haul vegetation materials (leaves, tree limbs) to dump locations, and are equipped with snow fighting equipment and perform snow and ice control activities during winter months. County bucket trucks are used to trim/remove trees and limbs, hang banners on bridges-poles and other locations, and aid electricians in performing line work. County heavy equipment is used to load bulk materials, excavate trench work – install drainage materials - berm roads – install lateral support materials to prevent erosion and other construction work, dredge creek culverts, clean landslides, clean up flooding issues, load and set barriers, and clear vegetation.
This equipment is utilized along over 408 miles of road and 533 bridges and culverts spread out county wide. The County's Public Works Department equipment is used throughout Allegheny County, often in maintaining infrastructure in less affluent, environmental justice, communities lacking resources of their own. This project will reduce toxic PM2.5 diesel emissions throughout the county and more likely in environmental justice communities.

Cost, Leverage, and Schedule

The project is expected to cost $5,712,300. No Leverage. The County can complete the project in approximately 12-16 months from project approval.

Project (4) - Port Authority Transit battery electric buses and charging station

(Project Participant Partner – Port Authority Transit of Allegheny County.)

Summary, Location and Background

This project involves replacing seven 60-foot diesel transit buses with seven zero tailpipe emission battery electric 60-foot buses for operation in Pittsburgh's Downtown – Uptown – Oakland – East End Bus Rapid Transit (BRT) corridor in the City of Pittsburgh and Wilkinsburg Borough, both of which are located in Allegheny County. This is Southwestern Pennsylvania's most heavily used transit corridor. One slow electric charger station would be installed at the East Liberty Garage along with other supporting infrastructure.

The Port Authority of Allegheny County (Port Authority or PAT) is Allegheny County's public transportation provider. It operates a bus and rail network comprised of 100 routes, an inclined plane,

and a paratransit system, which all carry over 60 million riders annually. Port Authority's transit vehicle fleet includes 752 35-foot, 40-foot and 60-foot buses.

Since the late 1980s, environmental advocates, public health professionals and citizens have desired reduction of emissions from transportation sources. The Clean Air Act Amendments (CAAA) of 1990 was the first federal legislation requiring diesel engines used in heavy-duty vehicles such as transit buses to significantly reduce emissions of PM2.5 and its precursors, NOx, VOCs and SO2. The CAAA implemented a schedule of progressively tighter PM2.5 emission levels for urban transit buses with a 98% reduction in PM2.5 emissions between 1990 and 2015. To comply with the CAAA, the engines on Port Authority's buses have become progressively cleaner. Smoke plumes emitted from the engines have become virtually non-existent. For 2015 and later, the CAAA standards for transit buses specify emission levels of 0.14 grams per brake horsepower-hour (g/bhp-hr) for hydrocarbons, 0.02 g/bhp-hr for nitrogen oxides and 0.01 g/bhp-hr for particulate matter. **However, even with these stringent standards, elimination of all vehicle-generated diesel exhaust is desired**.

The Downtown – Uptown – Oakland – East End Corridor in the City of Pittsburgh is the most heavily traveled transit corridor in Southwestern Pennsylvania and includes the second (Downtown Pittsburgh) and third (Oakland) largest employment centers and generators of traffic in the Commonwealth of Pennsylvania. Other neighborhoods within the corridor comprise some of Pittsburgh most densely populated communities.

To accommodate the demand, Port Authority currently provides a very high level of transit service in the corridor, particularly between Downtown and Oakland. Eight routes linking Downtown and Oakland with communities east of Oakland converge in Oakland and, collectively, combine to provide service up to every 2 – 3 minutes during weekday peak periods. Although a very high level of service is provided, intense traffic congestion within much of the corridor results in low speeds, unreliable service, uneven trip spacing and frequent overcrowding. To reduce travel times, increase reliability and enhance the efficiency of the service, Port Authority has partnered with Allegheny County, the City of Pittsburgh and the Urban Redevelopment Authority to implement a Bus Rapid Transit (BRT) project in the corridor. The project involves establishment of exclusive bus lanes in the Downtown – Uptown – Oakland segment of the corridor, replacing numerous bus stops with stations, installing traffic signals at key intersections with prioritized bus movements, enhanced fare collection, provision of real time information and acquisition of stylized, branded vehicles.

The National Environmental Policy Act (NEPA) review, a Categorical Exclusion (CE), has been completed. The Federal Transit Administration (FTA) approved the CE in October 2018 and the project is currently in the Final Design phase. Construction is anticipated to begin in 2021 and revenue service would begin in 2023.

A key component of the project is operation of vehicles dedicated to BRT service. The buses will be branded to identify them as vehicles serving the BRT corridor. For the core service between Downtown and Wilkinsburg, 60-foot battery electric buses are proposed. **This grant seeks funding for seven of the fifteen battery electric buses to be operated in the 7.8-mile core route**.

Technology Selection

Port Authority's general approach has been to purchase diesel buses with increasingly cleaner diesel engines, including diesel-electric hybrid buses. While the cleaner diesel and diesel hybrid buses have generated significantly lower levels of PM2.5 emissions compared to the engines on earlier diesel buses, the operations of these vehicles still resulted in some PM2.5 tailpipe emissions.

From the mid-1990s through the 2010s, battery electric technology for transit buses underwent major improvements. Initially, this technology was primarily used for short-distance shuttle and circulator services such as those in Chattanooga, TN and Santa Barbara, CA. Subsequently, battery electric propulsion technology had sufficiently improved for application to longer distance, heavy-duty urban transit service.

In 2014, the Traffic21 Institute of Carnegie Mellon University evaluated and compared the eight bus propulsion technologies for 40-foot and 60-foot vehicles specifically for Port Authority. The study results are documented in the report, "Which Alternative Fuel Technology is Best for Transit Buses?" **The Traffic21 researchers recommended that Port Authority proceed with battery electric bus (BEB) technology because it offered the greatest reductions in emissions among the technologies while providing significant reductions in operating and maintenance costs for the agency.**

Citizens, environmental advocates and stakeholders in Pittsburgh and Allegheny County are seeking not just to reduce overall PM2.5 emissions, but eliminate such emissions directly generated from vehicles. Replacing seven diesel buses with seven BEBs would result in annual emission reductions of 0.008 tons for PM2.5; 0.475 tons for NOx; 0.025 tons for HC, and save 72,000 gallons of diesel fuel annually.

Expected Benefits to Public Health and/or Environment and Community

Elimination of PM2.5 and its precursor emissions from transit buses will contribute to Allegheny County achieving progress in attaining the annual PM2.5 NAAQS. As will be explained below, environmental justice communities comprise much of the BRT corridor and higher than average concentrations of black carbon, an indicator of high PM2.5 levels, are present in much of the corridor. Elimination of vehicle-generated exhaust from transit buses will reduce overall PM2.5 in the communities along the BRT corridor. This will improve overall short term and long-term health for environmental justice populations in the corridor.

Cost

This grant application seeks $5,650,000 to cover the incremental costs of purchasing seven (7) battery electric buses (BEBs), one slow electric charger (150 kW) and associated garage improvements comprised of additional panels, breakers and wiring. The funding would cover the incremental costs of electric buses over diesel buses. With an incremental cost of $750,000 per BEB over the cost of a diesel bus, the total vehicle component of this application is budgeted for $5,250,000. The remaining $400,000 would cover the costs of one slow charger and the garage improvements.

Item	Units	Unit Cost	Total
Seven 60-Foot Battery Electric Buses (cost increment)	7	$750,000	$5,250,000
One slow electric charging station	1	$150,000	$150,000
Switchgear breaker and panelboard with breakers	1	$50,000	$50,000
New conduit and power cabling	1	$50,000	$50,000
Electrician labor costs	1	$100,000	$100,000
25% contingency for installation of infrastructure	1	$50,000	$50,000
Total Grant Funds			**$5,650,000**

Leverage (“Other” leverage)

Leverage will exist in the form of the amount paid for the base amount of the bus cost. The Federal Transit Administration base amount funding equals $4,200,000, Pennsylvania State base amount funding equals $1,015,875, and Allegheny County base amount funding equals $34,125. Total “Other” leveraging for the battery electric buses equals $5,250,000.

Schedule

Battery electric buses will be delivered within 16 months after placing the order. One electric charging station will be installed at the East Liberty Garage along with switchgear breaker and panelboard with breakers, conduit and the cable. No other work would be needed on the garage or any adjacent property for charging facilities to service the vehicles proposed for this application. No environmental evaluation is required, which significantly simplifies and expedites delivery of this project. Upon delivery, the seven new vehicles will be assigned to the East Liberty Garage. When revenue operations begin, infrastructure improvements along Fifth and Forbes Avenues in Downtown, Uptown and Oakland will be completed and the new buses will be deployed in BRT revenue service in mid-2023.

B. Emissions Inventory & Progress Towards Attainment

The emissions inventory is taken from the "Attainment Demonstration for the Allegheny County, PA PM2.5 Nonattainment Area, 2012 NAAQS." Pollutants inventoried there include primary (direct) PM2.5 along with precursors SO2, NOx, VOC, and NH3. (Ref: Chapter 4 of SIP90 linked below.) The emissions inventories were compiled for all major and some minor sources within Allegheny County. Sources in the emissions inventories include stationary point sources, area sources, nonroad mobile sources, and onroad mobile sources. Fire and biogenic emissions are also included in the inventory. The year 2011 was used for base case emissions inventory, projected to a future case attainment year of 2021, which will be shown here due to its proximity in time.

Allegheny County Emissions Inventory (Future Case - 2021)

Source type	PM2.5	PM2.5(filt)	PM2.5(cond)	PM10	SO2	NOx	VOC	NH3
Point	2,256	1,256	999	2,722	5,921	7,928	1,534	202
Area	2,708	2,226	472	5,486	1,079	6,664	10,221	615
Nonroad mobile	**234**	**234**	**0**	**248**	**5**	**2,212**	**2,752**	**6**
Onroad mobile	**266**	**266**	**0**	**722**	**31**	**5,708**	**3,479**	**209**
Fires	24	24	0	29	2	5	64	4
Biogenics	0	0	0	0	0	166	5,876	0
Total	5,488	4,007	1,471	9,207	7,039	22,686	23,926	1,037

Within the inventory, "nonroad" sources encompass a diverse collection of off-highway engines, including (but not limited to) outdoor power equipment, recreational vehicles, farm and construction machinery, lawn and garden equipment, industrial equipment, and other sources. While "onroad" sources include passenger cars, light-duty trucks, heavy-duty trucks, buses, and motorcycles. The Motor Vehicle Emissions Simulator (MOVES) model was utilized to generate emissions based on traffic counts, vehicle speeds, vehicle population growth, and other factors.

The inventory listings by process are included in the Appendix D (Emissions Inventories) of the Attainment Demonstration, including a summary of specific local source revisions and projections. Tables D.7 and D.9 address source category inventories related to the proposed projects. Excerpts relevant to the projects are shown below.

Table D.7 Future Case (2021) Nonroad Mobile Sources (tons/yr)
(Excerpt from attached Appendix D of Attainment Demonstration)

Source Category	PM2.5	PM10	SO2	NOx	VOC	NH3
Off-Highway Equip (Diesel)	102.212	105.373	2.453	1564.032	188.472	3.714

Project (2) will help Allegheny County make progress toward meeting the PM2.5 NAAQS –

Replacing 8 pieces of diesel-powered equipment with propane fueled equipment reduces the inventory of Off-road, Heavy-Duty Diesel PM2.5 emissions by 0.11 tpy or 0.11 percent, and NOx emissions by 0.575 tpy or 0.02 percent.

Table D.9 Future Case (2021) Onroad Mobile Sources (tons/yr)
(Excerpt from attached Appendix D of Attain Demonstration)

Fuel	Vehicle Class	PM2.5	PM10	SO2	NOx	VOC	NH3
Diesel	Light Duty	14.172	29.929	1.564	361.145	111.260	5.086
Diesel	Heavy Duty	115.759	203.013	7.290	2428.913	162.108	12.216
CNG	Heavy Duty	0.311	0.974	0.039	20.094	3.650	0.177

Projects (1), (3), and (4) will help Allegheny County make progress toward attainment for the PM2.5 NAAQS --

Project (1) - Replacing 10 diesel powered waste haulers with 10 CNG powered waste haulers reduces the inventory of On-road, Heavy-Duty Diesel PM2.5 emissions by 0.119 tpy or 0.1%, and NOx emissions by 1.327 tpy or 0.05%.

Project (3) Replacing 31 pieces of diesel-powered equipment with clean diesel equipment reduces the inventory of On-road, Heavy-Duty Diesel PM2.5 emissions by 0.08 tpy or 0.07 percent, and NOx emissions by 0.7 tpy or 0.03 percent.
Project (4) Replacement of 7 clean diesel-powered transit buses with enhanced, battery electric buses reduces the inventory of On-road, Heavy-Duty Diesel PM2.5 emissions by 0.008 tpy or 0.007 percent, and NOx emissions by 0.475 tpy or 0.02 percent.

Methodologies - Documentation of the regional inventory development is included in the Allegheny county Portion of the Pennsylvania SIP for PM-2.5 2012 standards, submitted to EPA by the state on September 30, 2019 ("2019 SIP"), Appendix E (Emissions Inventory Documentation). Emissions inputs used for the modeling are described in Section 5 (Modeling Demonstration) and Appendix F (Modeling Protocols) of the same SIP.

C. Innovative Emissions Reductions

Diesel replacement Projects (1), (2), (3) and (4) will take the related equipment to the cleanest available technology appropriate for the equipment, including the cleanest diesel, propane, CNG, hybrid electric, or battery powered equipment.

Project 4, the electrification of bus transit, which uses the lowest emission technology currently available, is particularly highly innovative. Nearly all transit in Western Pennsylvania is powered by diesel fuel or other carbon-based fuel sources such as compressed natural gas. Electric buses have the advantage of eliminating all vehicle tailpipe emissions potentially generating significant operating and maintenance cost savings due to the relatively high energy efficiency of electric motors and significantly fewer moving parts compared to internal combustion engines.

D. Roles and Responsibilities

The Allegheny County Health Department (ACHD) is the applicant. ACHD is responsible for preparing the grant application and administering the grant.

Project (1) - The City of Pittsburgh will be a project participant partner and responsible for replacing the 10 diesel powered waste haulers with CNG powered waste haulers and constructing the renewable fuel fueling station.
Projects (2) and (3) – In addition to preparing the grant application, the County of Allegheny will be responsible for replacing the 39 diesel powered pieces of equipment with propane and/or clean diesel-powered equipment.
Project (4) - The Port Authority will be a project participant partner and responsible for replacing the seven diesel powered transit buses with electric buses and constructing the electric charging station. Port Authority will be responsible for:

Section 2. Community Benefits, Engagement and Partnerships

A. Community Benefits

The PM2.5 concentrations in Allegheny County are among the highest in the nation and compromise the health and well-being of the Allegheny County residents. It is the desire of all stakeholders that more be done to reduce PM2.5 and its precursors in Allegheny County.

Project (1) the City of Pittsburgh CNG Waste Hauler Equipment replacement project, and
Projects (2) and (3) the Allegheny County Clean Diesel Replacement projects, will reduce emissions of fine particulate matter (PM2.5) and result in improved air quality in Allegheny County, including in many of the County's environmental justice communities.

Project (4) The Battery Electric Buses
The overall BRT project will provide significant mobility benefits for Allegheny County's residents, employees, students and visitors living within or traveling to and from attractions within the corridor. To the extent that the BRT transit improvements will cause travelers to shift from automobiles to

transit, air quality within the corridor will improve. Replacing diesel buses with BEBs will enhance the corridor's air quality even further. Vehicle tailpipe PM2.5 emissions, and precursor tailpipe NOx, HC and CO emissions will be eliminated for all transit trips operated with BEBs instead of diesel buses. According to EPA's DEQ, operation of the seven BEBs would result in an annual reduction of PM2.5 emissions by 0.008 tons in the BRT Corridor.

Project (4) Affected Communities

The following are the affected City of Pittsburgh neighborhoods along the core route of the BRT corridor: Downtown, Crawford Roberts, Uptown, South Oakland, West Oakland, North Oakland, Bloomfield, Shadyside, East Liberty, Larimer, Point Breeze North, Homewood West and Homewood South. Additionally, the Borough of Wilkinsburg is located within the corridor.

As documented in the Environmental Justice chapter of the BRT Categorical Exclusion (CE) document, for Allegheny County and the City of Pittsburgh, the minority population is approximately 22 percent and 33 percent, respectively. For Allegheny County and Pittsburgh, the percent of the population which is low income (households with a median income at or below 150 percent of Department of Health and Human Services poverty levels) that at this threshold is approximately 20 and 32 percent, respectively. Based on the demographic data and mapping by block group, and applying Federal Transit Administration guidance, the entire BRT project corridor is comprised predominantly of environmental justice communities. The greatest concentrations of environmental justice populations (minority and low income) in the BRT corridor are in the Terrace Village, Upper Hill, North Oakland, West Oakland, Squirrel Hill North, East Liberty and the Larimer neighborhoods.

Per the CE, the proposed project would include the use of new battery electric buses (BEBs) and rebranded diesel buses at commencement of service. The proposed project is also expected to improve travel times and reduce vehicle miles traveled. Overall, the proposed project would have no adverse impacts and offers air quality benefits by reducing energy consumption and polluting emissions.

The Carnegie Mellon University's Center for Atmospheric Particle Studies evaluation identified locations in Allegheny County with higher than average concentrations of black carbon. There are high levels of black carbon in along the Fifth and Forbes Avenues between Downtown and Oakland in the BRT Corridor. Deployment of BEBs in the BRT corridor would eliminate tailpipe PM2.5 emissions, thus benefiting significant numbers of Pittsburgh residents as well as workers and visitors in Downtown Pittsburgh, Uptown, Oakland (Pittsburgh's educational, medical and civic center) and communities along the East Busway east of Oakland.

B. Community Engagement and Partnerships

Project (1) the City of Pittsburgh CNG Waste Hauler Equipment replacement project, and
Projects (2) and (3) the Allegheny County Clean Diesel Replacement projects --

The community is very engaged in Allegheny County's efforts to improve air quality. Turnout at local hearings on planning efforts to reach attainment is considerable and citizens regularly voice their input at hearings on regulatory changes and source permits. An active environmental advocacy community exists including such organizations as Group Against Smog and Pollution, Clean Water Action, Clean Air Council, and the Breathe Project. All would likely be supportive of the projects in this proposal.

Project (4) The Battery Electric Buses

Community Engagement

Between 2011 and 2019, Port Authority engaged in a robust program of public outreach to the communities in the BRT corridor. Throughout most of this process, BEBs were specifically proposed as the vehicles providing the core service in the corridor. The public outreach has included the following:

- A stakeholders advisory committee with representation of communities within the project corridor.
- Public meetings to present plans, street designs and service concepts
- Presentations to neighborhood organizations, business groups, stakeholders and elected officials
- Meetings with organizations representing people with disabilities

One of the most significant impacts of community involvement occurred after an initial service plan was proposed. Major concerns were raised about how the service would impact transit riders living in communities east of Oakland. In response to these concerns, the service plan was revised and presented at several community meetings.

Additionally, in 2020, Port Authority has held a series of public meetings to address multiple transit issues including its long-range transit plan, fares, stop consolidation and service requests. Ten such meetings have been scheduled. Three of the meeting locations (Downtown, East Liberty and Oakland) are within the BRT corridor. Although these meetings were not convened to discuss specific environmental aspects of transit service, they represent a continuation of Port Authority's initiatives to build relationships with the communities in its service area. Significant additional community and stakeholder outreach will be undertaken during the Long-Range Plan. Thus, when deployment of BEBs occurs, partnerships with the community and stakeholders will have been established which will facilitate dissemination of information in the BRT corridor about the new vehicles.

Project (4) Partnerships

The Southwestern Pennsylvania Commission (SPC), which is the Metropolitan Planning Organization for the Southwestern Pennsylvania region, supports this project. In its letter to the Allegheny County Health Department, SPC states that the project is consistent with the Smart Moves Plan, the region's long-range plan.

Vehicle electrification, in general, and electrification of transit buses, in particular, is a priority for the Pittsburgh Region. The Duquesne Light Company (DLC) is advancing a Transportation Electrification Strategy to accelerate the adoption of electric vehicle in the region. A letter of support from DLC is included in this application.

Allegheny Places, Allegheny County's Comprehensive Plan, states that its aim is to "Protect and enhance the environment and public health by promoting energy conservation and continuing to improve the County's air quality." This project is consistent with this objective as electric buses are much more energy efficient than diesel buses and eliminate tailpipe emissions. A letter of support from Allegheny County Executive Rich Fitzgerald is included in this application.

Section 3. Project Sustainability

Project (1) the City of Pittsburgh CNG Waste Hauler Equipment replacement project, and
Projects (2) and (3) the Allegheny County Clean Diesel replacement projects will continue to achieve ongoing emission reductions over the multi-year lifetimes of the replacement equipment.

Project (4) – Battery Electric Buses

Fare revenues as well as ongoing funding from Allegheny County and Commonwealth of Pennsylvania sources will provide funds needed to sustain operations in the BRT corridor. As implementation of the BRT service is anticipated to reduce the expenses of providing service within the corridor, the overall project will enhance Port Authority's overall operational sustainability.

Delivery of the BEBs and their operation in the City of Pittsburgh and in the Borough of Wilkinsburg will be publicized. To the extent that such publicity increases local awareness of the BEBs are perceived as more desirable than conventional diesel buses, some drivers will be attracted out of their automobiles to public transit, thus further reducing vehicle-generated emissions.

This project represents Port Authority's first acquisition of 60-foot electric buses. Building on the experience gained with the first eight BEBs, these new buses will be deployed in the BRT corridor which is Southwestern Pennsylvania's most intensely used transit corridor. The length of the core route within the BRT corridor is 28% longer than the 88 Penn route's alignment and the 60-foot BEBs can accommodate about 40% more riders than the 40-foot BEBs.

Successful operation and maintenance of the 60-foot buses in the BRT corridor will give Port Authority the experience and confidence to deploy additional battery electric buses of this size in other high-use corridors in Port Authority's system. Additionally, deployment of BEBs in the Downtown – Uptown – Oakland – East End Corridor, may inspire the nine other systems serving Southwestern Pennsylvania to consider BEBs for their services, as well.

Section 4. Environmental Results – Outcomes, Outputs and Performance Measures

A. Expected Project Outputs and Outcomes

The projects will significantly reduce emissions of particulate matter PM2.5, especially in environmental justice areas. The result is that these projects support the EPA Strategic Plan Goals described below:

EPA's 2018-2022 Strategic Plan Goal 1, "A Cleaner, Healthier Environment"; Objective 1.1: "Improve Air Quality" –"work with states and tribes to accurately measure air quality and ensure that more Americans are living and working in areas that meet high air quality standards."

i. **Outputs**. Outputs include 10 cleaner operating renewable CNG fueled City waste haulers along with a renewable fuel fueling station, 39 clean diesel or propane fueled Allegheny County replacement pieces of equipment, and seven Port Authority Transit battery electric buses operating along the Bus Rapid Transit corridor. Other expected outputs include the quarterly progress reports and a final report delivered in accordance with the grant requirements.

ii. Outcomes. Through all four projects of this grant, PM2.5 emissions will be reduced in the City of Pittsburgh and throughout Allegheny County, including where several environmental justice communities are located. These PM2.5 reducing emissions projects will beneficially affect the Allegheny County PM2.5 non-attainment area as exposure to PM2.5 is associated with short-term health effects such as eye, nose, throat and lung irritation, coughing, sneezing and runny nose, shortness of breath and asthma attacks. People breathing in PM2.5 are more likely to need to be admitted to hospitals for treatment of respiratory and cardiovascular hospital ailments. Studies also suggest that long term exposure to fine particulate matter may be associated with increased rates of chronic bronchitis, reduced lung function and increased mortality from lung cancer and heart disease. Those with breathing and heart problems, children and the elderly may be particularly sensitive to $PM_{2.5.}$

In addition, Project (4), the Battery Electric Buses project, will eliminate vehicle generated emissions. According to the EPA Diesel Emissions Quantifier (DEQ), replacing seven diesel buses with seven BEBs would result in annual emission reductions of 0.008 tons for PM2.5; 0.475 tons for NOx; 0.025 tons for HC and 0.1 ton for CO, and save 72,000 gallons of diesel fuel annually. According to the Traffic 21 research cited above, agency costs for owning, operating and maintaining a battery electric bus BEB is 24% less over its lifetime compared to a conventional diesel bus. Also, to the extent that travelers in automobiles are enticed to public transit air quality will be enhanced further. Finally, knowledge and experience gained from the BEB project will be shared to enhance the transit industry's understanding of BEB technology.

All the projects will promote progress towards achieving environmental justice objectives, most notably for the case of Project (4), where, as noted above, environmental justice communities comprise much of the BRT corridor and higher than average concentrations of black carbon, an indicator of high PM2.5 levels, are present in much of the corridor. Elimination of vehicle-generated exhaust from transit buses will reduce overall PM2.5 in the communities along the BRT corridor. This will improve overall short term and long-term health for environmental justice populations in the corridor.

Anticipated Outputs and Outcomes

Outputs	***Outcomes***
Project (1) Replace 10 diesel powered waste haulers with CNG powered waste haulers and add a renewable fuel fueling station	Annual emission reductions = 0.119 tons PM2.5, and 1.327 tons NOx
	Lifetime emission reductions = 0.595 tons PM2.5, and 6.636 tons NOx (5 yr. lifetime)
Project (2) Replace 8 pieces of diesel-powered equipment with propane fueled equipment	Annual emission reductions = 0.11 tons PM2.5 and 0.6 tons of NOx.
	Lifetime emission reductions= 0.4 tons PM2.5 and 1.9 tons of NOx.
Project (3) Replace 31 pieces of diesel-powered equipment with clean diesel equipment	Annual emission reductions = 0.08 tons PM2.5 and 0.7 tons NOx
	Lifetime emission reductions = 0.15 tons PM2.5 and 1.324 tons NOx
Project (4) Replacement of 7 clean diesel-powered transit buses with enhanced, battery electric buses	Elimination of vehicle generated emissions. Annual emission reductions = 0.008 tons of PM2.5, 0.475 tons of NOx and 0.025 tons of HC. Annual diesel fuel savings = 72,000 gallons.
	Elimination of vehicle generated emissions

B. Performance Measures

For all four projects, the extent of procurement and the placing into service of the replacements, and the construction of the refueling station, propane storage tank and the electric charging station, will be the performance measures.

C. Performance Plan

For all four projects, the ACHD will track the extent of procurement and the placing into service of the replacements, and the construction of the refueling station, propane storage tank and the electric charging station, through quarterly reports required of each project participant partner, through invoice tracking, and through on-site inspections of replacement equipment.

D. Timeline and Milestones

Estimated and reasonable timeline for various tasks associated with the project.

Activity	Responsible Entity	Estimated Timeline
Grant preparation & submittal	ACHD, w/project participant partners	March 24, 2020
EPA review of app and selection notification	EPA	March 17, 2020 to June 12, 2020.
Prep ACHD/project participant partners agreement.	ACHD, w/project participant partners	June 13, 2020 to December 31, 2020.
Order and procure for diesel Projects 1 to 3	City & County	January 1, 2021 to December 31, 2021.
Design Engineering for PAT project	PAT	Complete.
Order & procure electric transit buses	PAT	See detailed PAT Schedule, below.
Place replacement equipment in service for Projects 1 to 3	City & County	January 1, 2022
Start-up revenue service for electric buses	PAT	See detailed PAT Schedule, below.

Detailed PAT Schedule

EPA Announces Award	October 1, 2020
Port Authority Board approves vendor to manufacture electric buses	March, 2021
Start of 60-day period with pre-build meeting and finalization of vehicle specifications	May, 2021
Issue Notice-to-Proceed to selected vendor to begin manufacturing vehicles	July, 2021
Installation of the electric charging station and additional panels, breakers and wiring	Early 2023
Delivery of electric buses to Port Authority, testing of buses and training of op/maint staff	Early 2023
Buses enter revenue operation	Mid 2023
Seven 2011 model New Flyer diesel buses retired	Mid 2023

Section 5. Programmatic Capability and Past Performance

A. Management, Completion and Reporting Requirements

Since 2005, the ACHD Air Quality Program has had significant experience with diesel powered equipment Retrofit/Repower/Replacement projects, including those funded by EPA ($3.5 Million ARRA Stimulus grant) and those it funds from its own Clean Air Fund. See table below.

Project	Equipment Retrofitted	Funding Amount & Source	Year
Penn Hills Schools	75 School Buses retrofitted w/DOCs	$185,000 ACHD Clean Air Fund	2005
Deer Lakes Schools	10 School Buses; DOCs	$10,650 ACHD Clean Air Fund	2006
City of Clairton	11 Municipal Vehicles; DOCs	$135,000 ACHD Clean Air Fund	2008
Port Authority	9 Bus repowers/2 New Hybrid buses	$1,007,500 EPA ARRA Stimulus	2009
CSXT Trans	1 Repowered switcher locomotive	$875,0000 EPA ARRA Stimulus	2009
Construct Assoc	40 Construction Vehicles	$1,231,939 EPA ARRA Stimulus	2009
Multi Serv Inc.	8 Dump Trucks retrofitted w/DPFs	$300,500 EPA ARRA Stimulus	2009
City of Pittsburgh	33 Refuse Trucks retrofitted w/DPFs	$433,000 EPA ARRA via the DEP	2009
"Build it with Clean Diesel"	Construction equip operated by small business in Allegheny County.	$920,000 ACHD Clean Air Fund made available. $375,000 spent.	2011 -2017
Neville Island Clean Diesel	26 off-road equip retrofit DPFs.	$750,000 ACHD Clean Air Fund	2014 -16

B. Management, Completion and Reporting Requirements

The ACHD successfully completes and manages a Clean Air Act Section 105 grant (Grant# A-003041-20) for Support of Air Pollution Planning and Control Programs, and a Section 103, Special Studies grant (Grant# PM-973128-02-0) for fine particulate matter PM2.5 monitoring. The Department regularly meets the reporting requirements under those agreements and documents the progress the Air Quality Program makes toward achieving the expected results, i.e., outputs and outcomes, by completing the EPA work plan documents as necessary. The projects to be funded under this grant application do not replicate activities already being funded by any of the above-mentioned grants.

The Department is currently administering an EPA grant for a pilot fireplace conversion project (XA-96343101-1). In 2015, the Department administered a $2.9 Million Targeted Air Shed Grant (EM-83493601-1) from EPA that installed a low emissions quench tower at the U.S. Steel Clairton Coke Works, greatly reducing PM2.5 emissions.

C. Staff Expertise

Jayme Graham, Manager of the ACHD Air Quality Program and **Sandra Etzel**, Manager of Planning for the AQP, and **Jason Maranche**, Air Pollution Control Engineer, have significant knowledge of the issues surrounding the Allegheny County PM2.5 designation and what actions must be taken to reach attainment. ACHD has experienced grant managers and other resources necessary to successfully manage this grant. Deputy Director, **Ronald Sugar**, and Finance Manager, **Kim Joyce**, have had experience with state and federal grants, and will provide fiscal management for this project and will submit all required reports. Ms. Graham and Ms. Etzel have successfully handled recent Clean Air Act Section 105 grant (A-003041-20), and a Section 103 Special Studies grant (Grant# PM-973128-02-0) for fine particulate matter PM2.5 monitoring. **Thomas Lattner**, Air Pollution Control Engineer, has experience with U.S. EPA grants (Current Fireplace Conversion Grant XA-96343101-1, Targeted Air Shed Grant EM-83493601-1, National Clean Diesel Funding Assistance Agreement 2A-97379401, and Woodstove Exchange Cooperative Agreement XA-83276801).

Section 6. Leveraged Funding

Projects 1 and 4

Regarding the City of Pittsburgh Waste Hauler Replacement project and Port Authority Battery Electric Buses Replacement projects, project participant partners will contribute "in-kind" services in the form of project management and all technical work during the projects.

Project 4

The budget for this application proposes the following matches for the seven BEBs, one electric charging stations and associated garage infrastructure:

Leveraged Funding ("Other" Leveraging) for the Battery Electric Buses Project

Item	Funding sources	Amounts
Battery Electric Buses		
Base amount bus cost	**Federal Transit Admin**	**$4,200,000**
Base amount bus cost	**State Match**	**$1,015,875**
Base amount bus cost	**Allegheny County Match**	**$34,125**
Electric Bus Increment	EPA Targeted Airshed	$5,250,000
One electric charger station, switchgear breaker and panelboard with breakers, conduit and cable, labor and contingency	EPA Targeted Airshed	$400,000
Total "Other" Leveraging for Battery Electric Buses Proj.		**$5,250,000**

In addition, the electric buses are an integral element of an overall Bus Rapid Transit (BRT) project for which funding is being secured from Port Authority, City of Pittsburgh, Allegheny County, Commonwealth of Pennsylvania and other federal sources. The overall amounts ("Other" leveraging) are as follows:

Source	Funding Amount
Port Authority	$23,191,440
City of Pittsburgh	$20,300,000
Allegheny County	$31,558,514
Commonwealth of Pennsylvania	$12,114,286
Federal	$137,835,760
Total	**$225,000,000**

This funding for the non-vehicle components of the BRT project will be used to make street and intersections improvements, including dedicated bus lanes, to ensure the most effective operation of and reliable service of the buses. Additionally, stations with amenities will be installed along the BRT corridor which will enhance the appeal of transit service for existing riders and attract new riders to the system. Through improvements such as transit signal priority and dedicated bus lanes, the new electric vehicles will not be just more buses on city streets. They will provide more reliable and effective service running on shorter schedules to enhance the overall experience for riders.

Section 7. Budget

A. Expenditure of Awarded Funding

As indicated above in Section IV.D, "Timelines and Milestones," upon notification of being the recipient of an award under this RFA, the ACHD would immediately set about preparing letters of agreement between ACHD and its project participant partners covering all aspects of the projects. These legal contracts detail what the ACHD will fund, what the specifications the project participant partner must meet when procuring the equipment that is to meet the project objectives, what schedule requirements must be met to ensure that the federal funds are expended in a timely manner, what scrappage requirements must be met, if any, what reporting requirements must be met, what invoicing requirements must be met, and what federal administrative and programmatic requirements must be met. These legal contracts are approved at the highest appropriate level of all parties involved.

Once contracts/letter agreements are signed, control of the awarded federal funds is implemented by the Air Program through scrutiny of invoices to ensure expenditures are valid and appropriate, and to the ACHD Fiscal Manager, who follows all appropriate federal procedures in drawing down awarded funding. The Air Program Manager submits necessary periodic reports to the EPA detailing progress made during the reporting period to help ensure that awarded grant funds are expended in a timely and efficient manner.

B. & C. Reasonableness of Budget and Budget Detail

Detailed Budget Narrative

The proposed budget for these projects is $18,852,517 in grant funding and $5,250,000 in "Other" leveraged funding. ACHD's $18,852,517 grant funding request (includes ACHD Personnel Costs) will be used to fund activities undertaken by ACHD and its project participant partners the City of Pittsburgh, and

Port Authority, related to the replacement of diesel powered waste haulers, trucks, other equipment, and transit buses, as well as the installation refueling stations and electric charging stations. The City of Pittsburgh, and Port Authority will also provide "In-kind" services of project management. ACHD "In – Kind" services include oversight of individuals tasked with ensuring that grant deliverables are being appropriately verified and tracked in all aspects from verification of work to expense and report tracking. ACHD is requesting minimal staff time for administrative tasks associated with contract management of its project participant partners and financial management.

PERSONNEL – ACHD	**Federal**	**Cost Share**	**"Other" Leverage**
Fiscal Officer – $50,000yr x 5% x 5yrs	$12,500		
Contract Administrator – $45,000yr x 5% x 5 yr	$11,250		
Air Quality Engineer – $65,000 x 5% X 5yrs	$16,250		
TOTAL WAGES	**$40,000**		
Fiscal Officer - 43% Fringe	$5,375		
Contract Administrator - 43% Fringe	$4,838		
Air Quality Engineer - 38% Fringe	$6,175		
TOTAL FRINGE BENEFITS	**$16,388**		
EQUIPMENT	**Federal**	**Cost Share**	**"Other" Leverage**
Order and procure 8 propane powered County Parks Dept. equipment and a propane fueling station	$869,000		
Order and procure 31 Clean Diesel-powered County Public Works Dept. equipment pieces	$5,777,129		
TOTAL EQUIPMENT	**$6,646,129**		
OTHER–PARTICIPANT SUPPORT COSTS	**Federal**	**Cost Share**	**"Other" Leverage**
Detailed design and engineering	$0.00		In-kind
City of Pgh - order and procure 10 CNG powered waste haulers and one renewable fuel fueling station	$6,500,000		
Port Authority - order and procure 7 Battery Electric Buses and one electric charging station	$5,650,000		$5,250,000
TOTAL OTHER	**$12,150,000**	**$0.00**	**$5,250,000**
TOTAL FUNDING	**$18,852,517**	**$0.00**	**$5,250,000**
TOTAL PROJECT COST (federal and non-federal)	**$18,852,517**		
"Other" Leveraged Funds	**$5,250,000**		